

**Tempe Fire Department Policies and Procedures**  
**Aircraft Incidents**  
**209.02**  
**Rev 6-9-92**

## **PURPOSE**

Approximately 80% of all airplane accidents happen within 2000' of a runway. Most serious accidents happen during take off and landing. The primary concern of Tempe Fire Department personnel, as first responders, involves incidents occurring east of Sky Harbor International Airport.

## **INTRODUCTION**

Incidents can be categorized as a high impact or low impact crash. High impact crashes involve high angle, high speed impact with little pilot control. This type of crash usually results in total loss of life on board and total breakup of the aircraft. Wide body planes are more likely to have survivors because the plane can absorb more impact. In Tempe, because of the proximity to Sky Harbor, we will most likely deal with a low impact crash. Low impact crashes usually occur on or near an airport because there is some degree of pilot control. Substantial sections of the fuselage remain intact and many people on board may be able to survive the impact. Unfortunately, many people who survive the initial impact may be killed by a post crash fire. People who are able to get out of the wreckage probably will be out before help arrives. They may have been able to get clear due to their own efforts or they may have been thrown clear on impact.

Tests conducted by the FAA have established that people who are trapped in burning airplanes have a 90 second life expectancy due to toxic smoke and rapid flame spread. Interviews with survivors indicate that by their second breath they feel they are going to collapse. Case studies have shown that many passengers who would normally have lived perished due to toxic gases from aircraft interior finishes. Plastic, foam rubber, and personal items give off a wide assortment of toxic gases under fire conditions.

## **POSSIBLE CONDITIONS**

- . Some victims may be trapped in their seats and have to be cut free.
- . Seats may break loose from floor tracks with passengers still strapped in.
- . The scene may be littered with bodies, body parts, airplane parts, luggage, and other cargo, making access difficult.
- . Traffic congestion will be a problem at any major incident. Critiques of major air disasters have revealed that enormous congestion problems arise due to responders and onlookers converging on the scene. As access becomes blocked, people tend to abandon their vehicles and walk to the scene making congestion even worse.
- . Other considerations include hazardous material (fuel as well as cargo), water rescue, involvement with residential or industrial areas or an open area with no exposures.

## **PROCEDURE**

Acquire as much information as you can while in route to the crash site. This may include type of plane, number of people on board, quantity of fuel, wind direction, etc. The assignment may vary depending on dispatch information and the proximity to Sky Harbor.

Determine the best response route and relay this information through the Alarm Room to all responding units. Terrain, water supply, distance from a roadway, capabilities of apparatus, and traffic congestion are prime factors when determining response routes. Fire apparatus may become stuck and/or damaged when driven off-road.

If aircraft crash rescue equipment is dispatched from Phoenix Fire Station #19, they may respond directly down the riverbottom. The attack trucks on the airport have rough terrain capabilities and have access to the riverbottom off the ends of the runways.

## **SIZE-UP**

Give a size-up based on what you know and what you see. This should include the size or type of aircraft, fire involvement, exposures, and obvious hazards to firefighters, passengers, and property. Initial tactics will depend on accessibility to the crash site, number of rescues to be made, extent of fire involvement, exposures, and the need for additional resources.

If you determine that this is a major incident, tell the Alarm Room to activate the Emergency Operations Center (EOC). Activation of the EOC starts the process of assembling a pre-planned command and management team to deal with events and resources throughout the incident.

Anticipate the need for specialized equipment. Command should reference the resource manual on BC-7 when determining these needs. Earth-moving equipment, cranes, shoring equipment, heavy jacks, and fork lifts are examples of some of the special needs that can be directed to Tempe's Field Services Division. A representative from Field Services should be assigned to the command post. Other Field Services personnel will proceed to their equipment yard and respond with requested equipment.

## **TACTICS**

Establish a staging area early. Make the area large enough to accommodate equipment from other departments and agencies (such as Field Services, etc.). Helicopters will require a separate area for staging. A landing zone should be selected that will be convenient for ground transportation to relay patients to helicopters for flight to hospitals.

The Operations Area must be identified and relayed to the Police Department, who will assist in securing it. The Operations Area will encompass the hazard zone(s) and is limited to people and equipment necessary to support activities in the hazard zone(s). All unauthorized people are to be removed from the Operations area. Everything in the Operations Area is considered to be a crime scene and will be subject to intense investigation.

Access to and egress from the Operations Area will be controlled by the Tempe Police Department. Passes will be issued by Tempe Police officers and only people with proper credentials and purpose will be allowed in.

Since a large aircraft involved in a crash may be widely scattered, it may be necessary to define multiple hazard zones within the Operations Area. As each hazard zone is identified, it should be cordoned off. Lobby control is to be used to control access and egress at one point for each zone. If hazardous materials are suspected, entry will be limited to appropriate entry teams.

Each hazard zone may have to deal with a different set of circumstances, therefore, the needs and tactics may vary from zone to zone.

The airspace above the scene will be automatically controlled by air traffic control. Any aircraft that responds to aid in the crash will communicate with air traffic controllers and will respond as directed.

Emscom (med channel 4) is not available on all helicopters that may respond, but all helicopters do have common air traffic control frequencies. In order to establish good communication for helicopter deployment, a helicopter pilot with Emscom capabilities should be landing zone sector officer. He can coordinate communication between

helicopters, command, transportation sectors, and air traffic controllers as needed. Communication can also be established between air traffic controllers and the command post on 379-4226, if necessary.

As helicopters are staged in a landing zone, injured people may be transported by ground to the waiting helicopter or the helicopter may be dispatched to a specific location at the crash scene to pick up patients. Helicopters may also be used to transport personnel and equipment to hard-to-reach areas of the crash scene. It may be helpful to survey the area from a helicopter to get a good overview of the disaster. The news media may be very helpful with this task.

Each aircraft type differs in structure and systems design. Battery locations, oxygen bottle storage, fuel supply, fuel shut-off procedures, and door opening methods are examples. An aircraft mechanic or representative that is familiar with the involved type of aircraft may be a valuable source of information and can aid in safely dealing with the aircraft structure and systems.

Walking wounded may walk toward the sound of sirens so they will be the first encountered and most likely will be the least wounded. Firefighters will have a natural tendency to help the first victims they encounter. This will delay help reaching trapped and more critically-wounded and may cause a greater loss of life. Triage should begin immediately and people moved to a treatment area. Initial efforts should be directed toward the saveable victims. Establish extrication, treatment, and transportation sectors as soon as possible.

Once survivors are in treatment, transportation must be a priority. There may not be enough resources or time to properly stabilize everyone at the scene. Good communication between command, treatment, transportation, Alarm, and area hospitals is essential.

Aircraft damage may vary. The fuselage usually separates into three pieces leaving the cabin, main body, and tail section in separate locations. These sections can come to rest in any position making rescue difficult. If the main body is upside down it will start to collapse under its own weight; making jacks and shoring a must. It may also be necessary to stabilize the aircraft to prevent rolling or sliding during emergency operations.

Forcible entry should only be used after attempts to open all normal accesses have failed. Door types and operating mechanisms differ with each type of aircraft. Therefore, operating instructions are posted on the outside of the door near the opening mechanism. When attempting to open any door, assume the escape slide is armed and ready to be deployed and stand to the side. When armed, slide activation is automatic and occurs in less than ten seconds.

Doors and hatches on commercial aircraft are well reinforced, designed for high altitude pressurization. Prying a door on a plane is a difficult, time consuming task. It is usually easier to cut out the entire door and frame. If cutting is necessary, cut within 20 inches of the opening to prevent cutting into aircraft systems. An exception is on wide body aircraft with hydraulic or electric assist doors that may have hydraulic or electric lines nearer to the door. Hydraulic systems are pressurized to 3000 PSI even after engine shut down and rupturing one of these lines could cause injury.

If it is necessary to cut through the fuselage, many factors must be considered. Structural members and attached skin usually are made of aluminum alloys. Aluminum is a non-ferrous metal and will not spark, but magnesium, titanium, and steel also are used in aircraft construction and do cause sparks. Air monitoring equipment should be used to determine the presence or absence of an explosive atmosphere in an area around a fuel spill.

The proper method to determine where to make your cuts is to examine the rivet pattern on the outside of the aircraft. The exterior skin of the aircraft is fastened to the structural members of the frame with rivets. Double or triple rows of rivets may indicate the location of large structural member, interior bulkhead, or deck. Avoid trying to gain entry at these locations. Another area of the fuselage that should be avoided is located 3'-4' below the interior deck on most large aircraft. This area is heavily reinforced and usually contains extensive aircraft systems. Some fuel storage may be encountered below deck as well, although, most fuel storage is contained in the wings.

A rescue saw will cut the outer skin with little trouble in most conditions, but no one tool will do everything. The Hurst tool, air bags, axes, sledge hammers as well as jacks, shoring, and hand tools will all serve a purpose.

Specialized tools and equipment can be called for from Tempe Field Services. A cutting torch is an excellent tool for cutting through heavy structural components.

Foam lines must be in place and a foam blanket must be maintained during rescue operations. Extensive quantities of fuel may be liberated all around the exterior as well as inside the aircraft. AFFF hand lines should also be in place inside as well as outside of the aircraft to protect rescue personnel and victims. There are numerous ignition sources (hot aircraft engines, electrical systems, rescue equipment, etc.). Even if a fire has not occurred or post crash fire has been extinguished a fire or rekindle is likely.

Stop fuel leaks if possible and dike the fuel runoff so that an effective blanket of AFFF can be maintained.

Initial fire suppression efforts will have to be done with a limited supply of AFFF. The Tempe Fire Department presently carries 10 gallons of AFFF on each pumper, so until additional foam supplies are established, we may have to depend on water. The longer an aircraft fire burns, the hotter it gets, reaching as high as 2000°. Aluminum alloys melt at around 1200° so a fast offensive attack with water while foam is being set up may be the best chance that some victims will be saved.

Combat fires that threaten known live victims first. Protect open doors that may be used as escape routes, and try to push the fire away from passengers even if extinguishment cannot be accomplished immediately. If you have a choice, you can control the fire better from upwind. As entry is made into the aircraft, positive pressure ventilation can be utilized in the same manner as for structure fires.

Water towers from aerial ladders can be helpful in cooling the area. An aerial ladder can also be used for observation of the crash site.

## **HAZARDOUS MATERIALS**

All aircraft accidents must be considered to be hazardous materials incidents. At the very least they will involve large amounts of fuel. Less obvious hazards include hydraulic fluids, compressed gas cylinders, tire and wheel assemblies as well as modern composite materials being used for aircraft construction.

Hazardous cargos can be present on most commercial airplanes, whether it is a passenger or cargo plane. Hazardous materials (referred to as dangerous goods in aviation) are transported according to guidelines established either by the Department of Transportation (DOT) or the International Civil Aviation Organization (ICAO).

The DOT standard is "Title 49 of the Code of Federal Regulations" (49 CFR). This applies to trucks, trains, ships, pipelines, and aircraft within the United States. The ICAO publishes "Technical Instructions for the Safe Transportation of Dangerous Goods by Air" and is enforced worldwide. Phoenix Sky Harbor is an international airport so dangerous goods can be expected from almost any place in the world. Unfortunately, not all dangerous goods are declared or packaged properly.

The documentation that accompanies dangerous goods varies from air carrier to air carrier. The shipper is responsible for properly packaging and labeling the shipping container. There should also be a copy of shipping documents in the flight deck area.

Dangerous goods are placed in one of four categories:

- . The first category includes materials forbidden on any aircraft, in any quantity, under any circumstances. However, even these materials may be transported illegally.
- . The second category includes materials that can be transported on cargo aircraft but are forbidden on passenger aircraft. This cargo will be applied with a special orange and black "cargo aircraft only." This type of cargo is extremely hazardous. This material must be accessible by the crew during flight.

- . The third category includes materials allowed to be carried in passenger or cargo holds. These materials are regulated by quantity and packaging requirements.
- . The fourth category is the one most frequently encountered in aircraft hazardous materials incidents. This category involves undeclared dangerous goods. They are transported in luggage and mail. The responsible person may be trying to avoid extra cost or is ignorant of the hazards involved.

## **POST CRASH**

A major aircraft incident could last several days. There may be as many as 200 separate agencies responding throughout the duration of the incident. The activities of personnel in the first hour will have the greatest impact on the potential for a successful outcome.

The Tempe Fire Department will have command of the incident for the first few hours. Responsibility will shift to the Tempe Police Department as fire department objectives are met. When the National Transportation Safety Board's (NTSB) investigators, known as the "Go Team" arrives, they will take charge and maintain control for the remainder of the incident.

The NTSB's primary function is investigation. They may be interested in interviewing anyone that was involved with the incident. Because of the NTSB's investigation, it is important that we leave known dead and body parts where we find them. Only move wreckage necessary for rescue or scene safety. Leave the cockpit voice recorder where it is found unless it needs to be moved for safekeeping. Photographs will be invaluable for post crash analysis and critiques so have a fire investigator start documenting the event as soon as possible.

The average cost for personnel and equipment to handle a major air crash is \$280,000-\$300,000 and does not include the cost of litigation following the event. These incurred costs are paid for out of a general fund that each airline contributes to.

The severity of air disasters makes it essential that post-traumatic stress be dealt with as soon as possible. Critical incident stress debriefing procedures should be initiated as soon as possible. No one should be allowed to work in the accident area for more than an hour or so before going to Rehab, even if fatigue is not a factor. Longer exposure may cause severe post-traumatic stress.